

(April 3, 2006)

Precast Concrete Panel Faced Structural Earth Wall Materials

General Materials

Concrete Leveling Pad

Leveling pad concrete shall be commercial concrete in accordance with Section 6-02.3(2)B.

Backfill for Precast Concrete Panel Faced Structural Earth Wall

All backfill material within the structural earth wall reinforced zone shall be free draining, free from organic or otherwise deleterious material.

Backfill material within the reinforced zone shall conform to Section 9-03.14(1), except that the maximum particle size for walls with geogrid reinforcement shall not exceed 1-1/4 inches.

All material within the structural earth wall reinforced zone shall be substantially free of shale or other soft, poor durability particles, and shall not contain recycled materials, such as glass, shredded tires, portland cement concrete rubble, or asphaltic concrete rubble. The material shall meet the following aggregate durability requirements:

<u>Property</u>	<u>Test Method</u>	<u>Allowable Test Value</u>
Los Angeles Wear, 500 rev.	AASHTO T 96	35 percent max.
Degradation	WSDOT Test Method 113	15 percent min.

For walls with metallic soil reinforcement, all material within the structural earth wall reinforced zone shall meet the following chemical requirements:

<u>Property</u>	<u>Test Method</u>	<u>Allowable Test Value</u>
Resistivity	AASHTO T 288	3,000 ohm-cm, min.
pH	AASHTO T 289	5 to 10
Chlorides	AASHTO T 291	100 ppm max.
Sulfates	AASHTO T 290	200 ppm max.

If the resistivity of the backfill material equals or exceeds 5,000 ohm-cm, the specified chloride and sulfate limits may be waived.

For walls with geogrid soil reinforcement, all material within the structural earth wall reinforced zone shall meet the following chemical requirements:

<u>Property</u>	<u>Test Method</u>	<u>Allowable Test Value</u>
pH	AASHTO T 289	4.5 to 9

Wall backfill material satisfying these gradation, durability, and chemical requirements shall be classified as nonaggressive.

Proprietary Materials
ARES Modular Panel Wall System
Tensar Geogrid Materials

Geogrid reinforcement shall conform to Section 9-33.1, and shall be a product listed in Appendix D of the current WSDOT Qualified Products List (QPL). The values of T_{al} and T_{ult} as listed in the QPL for the products used shall meet or exceed the values required for the wall manufacturer's reinforcement design as specified in the structural earth wall design calculation and working drawing submittal.

The minimum ultimate tensile strength of the geogrid shall be a minimum average roll value (the average test results for any sampled roll in a lot shall meet or exceed the values shown in Appendix D of the current WSDOT QPL). The strength shall be determined in accordance with ASTM D 6637 for multi-rib specimens.

The ultraviolet (UV) radiation stability, in accordance with ASTM D 4355, shall be a minimum of 70 percent strength retained after 500 hours in the weatherometer.

The longitudinal (i.e., in the direction of loading) and transverse (i.e., parallel to the wall or slope face) ribs that make up the geogrid shall be perpendicular to one another. The maximum deviation of the cross-rib from being perpendicular to the longitudinal rib (skew) shall be no more than 1 inch in 5 feet of geogrid width. The maximum deviation of the cross-rib at any point from a line perpendicular to the longitudinal ribs located at the cross-rib (bow) shall be 0.5 inches.

The geogrid shall not exhibit brittle fracture (snapping, or rapid crack development), when tested in accordance with Test Method WSDOT T 926.

The Engineer will take random samples of the geogrid materials at the job site. Approval of the geogrid materials will be based on testing of samples from each lot. A "lot" shall be defined as all geogrid rolls sent to the project site produced by the same manufacturer during a continuous period of production at the same manufacturing plant having the same product name. The Contracting Agency will require 14 calendar days maximum for testing the samples after their arrival at the WSDOT Materials Laboratory in Tumwater, WA.

The geogrid samples will be tested for conformance to the specified material properties. If the test results indicate that the geogrid lot does not meet the specified properties, the roll or rolls which were samples will be rejected. Two additional rolls for each roll tested which failed from the lot previously tested will then be selected at random by the Engineer for sampling and retesting. If the retesting shows that any of the additional rolls tested do not meet the specified properties, the entire lot will be rejected. If the test results from all the rolls retested meet the specified properties, the entire lot minus the roll(s) which failed will be accepted.

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2 All geogrid materials which have defects, deterioration, or damage, as
3 determined by the Engineer, will be rejected. All rejected geogrid
4 materials shall be replaced at no expense to the Contracting Agency.

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6 Except as otherwise noted, geogrid identification, storage and
7 handling shall conform to the requirements specified in Section 2-12.2.
8 The geogrid materials shall not be exposed to temperatures less than
9 -20F and greater than 122F.

10
11 Rubber bearing pads shall be a type and grade as recommended by
12 Tensar Earth Technologies, Inc.

13
14 Geosynthetic joint cover for all horizontal and vertical joints shall be a non-
15 woven geosynthetic as recommended by Tensar Earth Technologies, Inc.
16 Adhesive used to attach the geosynthetic to the rear of the precast
17 concrete facing panel shall be as recommended by Tensar Earth
18 Technologies, Inc.

19
20 **MSE Plus Wall**

21 Pins connecting the reinforcing mesh to the precast concrete panels shall
22 conform to AASHTO M 32 and shall be galvanized in accordance with
23 AASHTO M 111. Damage to the galvanizing shall be repaired with one
24 coat of Formula A-9-73 paint conforming to Section 9-08.2.

25
26 Bearing pads shall be serrated high-density polyethylene (HDPE)
27 copolymer pads with a Shore Hardness between 55 and 65.

28
29 Filter fabric joint cover for all horizontal and vertical joints shall be non-
30 woven geosynthetic conforming to AASHTO M 288. Adhesive used to
31 attach the geosynthetic to the rear of the precast concrete facing panel
32 shall be as recommended by SSL, LLC.

33
34 **Reinforced Earth Wall**

35 Reinforcing strips shall be shop fabricated from hot rolled steel conforming
36 to ASTM A 572 Grade 65 or approved equal, and shall be galvanized after
37 fabrication in accordance with AASHTO M 111. Damage to the galvanizing
38 shall be repaired with one coat of Formula A-9-73 paint conforming to
39 Section 9-08.2.

40
41 Bolts and nuts shall conform to Section 9-06.5(3), and shall be galvanized
42 in accordance with AASHTO M 232.

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44 Rubber bearing pads shall be a type and grade as recommended by the
45 Reinforced Earth Company.

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47 Vertical joint filler between panels, when specified in the structural earth
48 wall working drawings, shall be two inch square, flexible open cell
49 polyether foam strips, Grade UU-34, as recommended by the Reinforced
50 Earth Company.
51

1 Filter fabric joint cover for all horizontal and vertical joints, when specified
2 in the structural earth wall working drawings, shall be a pervious woven
3 polypropylene filter fabric as recommended by the Reinforced Earth
4 Company. Adhesive used to attach the fabric material to the rear of the
5 precast concrete facing panel shall be as recommended by the Reinforced
6 Earth Company.
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8 **Reinforced Soil Wall**

9 Reinforcing mesh shall be shop fabricated of cold drawn steel wire
10 conforming to AASHTO M 32, and shall be welded into finished mesh
11 fabric conforming to AASHTO M 55. Reinforcing mesh shall be galvanized
12 after fabrication in accordance with AASHTO M 111. Damage to the
13 galvanizing shall be repaired with one coat of Formula A-9-73 paint
14 conforming to Section 9-08.2.
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16 **Retained Earth Wall**

17 Tie strips shall be shop fabricated from hot rolled steel conforming to
18 ASTM A 570 Grade 50 or approved equal, and shall be galvanized after
19 fabrication in accordance with AASHTO M 111. Damage to the galvanizing
20 shall be repaired with one coat of Formula A-9-73 paint conforming to
21 Section 9-08.2.
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23 The embed loops and connector bars shall be fabricated of steel wire
24 conforming to AASHTO M 32, and shall be galvanized after fabrication in
25 accordance with AASHTO M 111.
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27 Filter fabric joint cover for all horizontal and inclined joints shall be a
28 monofilament filter fabric as recommended by Foster Geotechnical.
29 Adhesive used to attach the fabric to the rear of the precast concrete
30 facing panel shall be as recommended by Foster Geotechnical.